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Collecting Chicle in the American Tropics
(Part 3)

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Evils of the Present Methods of Collecting Chicle

It is quite obvious from the above description that the collection of raw chicle is still in a very crude state. The sapodilla trees are bled in a manner to secure the maximum yield at one time and at a minimum of expense without much attention to conservation. No extensive selection, planting, crossing, and grafting or budding of high-yielding trees have been made, and no systematic production of chicle on a large scale has been attempted. Practically all of the large and important chicle areas in tropical America are controlled by the governments and by large land-owning concerns and allotted to chewing gum companies and individual contractors as concessions. The general policy in the beginning was to grant only short-time leases, and as a consequence the holders attempted to extract as much chicle as possible while the concession was in their possession. The granting of short time leases, the growth habits of the sapodilla tree, and the nature of the countries in which it occurs have hindered development of systematic chicle production in the virgin sapodilla forests and the establishment of permanent centralized coagulating, cooking, and supply camps. Furthermore, the fact that *Achras zapota* can be profitably tapped only once within five to ten years has contributed much to this condition of affairs and often made it undesirable and unprofitable for the small contractors at least to retain their concessions for long periods of time.

In addition, the present basis of remuneration for tapping is a great handicap to conservation and systematic production of chicle. The chicleros are paid on the basis of the amount of gum extracted, and as long as this system is in vogue, it is unlikely that they will tap judiciously. However, experience has shown that this is the most and perhaps the only practical basis of remuneration under the pres-

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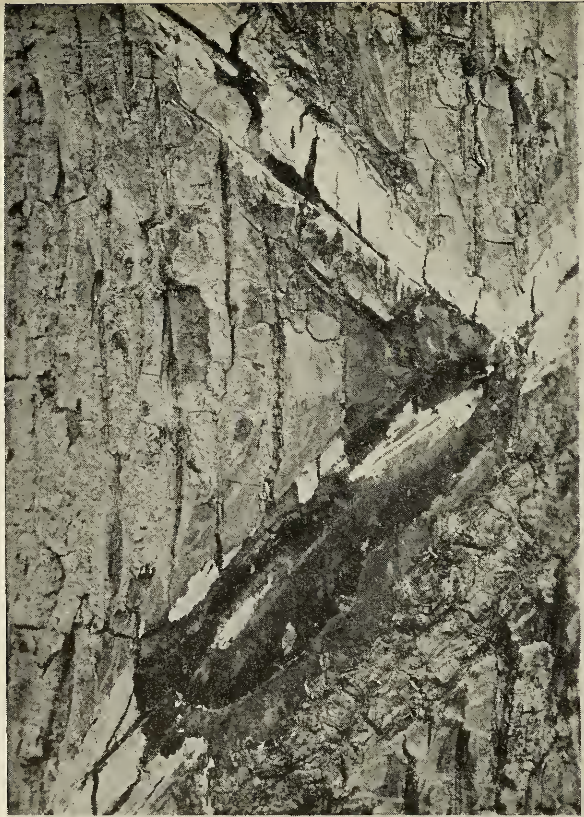
ent jungle conditions and type of labor, since supervision in the more or less inaccessible regions is almost impossible and would entail considerable expense. As a result no particular premium is placed on caution and care in tapping, and the only prerequisites of a chiclero under the present system are the ability to climb with the aid of a rope and make incisions which will secure the maximum yield of latex and convey it without loss to the collecting bag at the base of the tree. In their eagerness to secure the maximum amount of chicle during the rainy season, chicleros often overtap the trees and cause serious injury. Little regard is paid by the inexperienced chiclero to depth of tapping and injury to the cambium. According to conservative chicle contractors, approximately fifteen per cent of the tapped trees are eventually killed by the present native machete spiral method of tapping. Hoar (1924) claims that twenty-five per cent are killed. This estimate is based primarily on the number of dead trees which may be seen in the chicle areas and does not, however, represent accurate annual counts and careful observation. To the casual and inexperienced observer it would appear at first sight that the number killed each year is appallingly high, since the chicle forests contain a high number of dead standing trees, many of which bear the tapping scars. This large number, however, represents the accumulation of many years, since the sapodilla tree, because of its hardness, usually remains standing for several years after death and decays very slowly. Furthermore, many trees die a natural death or are killed by wood borers which enter after tapping. Consequently, the number of dead trees in any particular chicle area is not an accurate index of the number that is killed by tapping each year.

Nevertheless, the long machete used in the native system of bleeding is a difficult tool to control with respect to depth of tapping, and the cambium is often completely severed at the point of tangency of the bole and the cut. Quite frequently the cambium is removed with the chip of bark, and the wood is accordingly laid bare. Direct exposure thus of the cambium and xylem to the tropical midday heat often leads to a rapid drying out of the uninjured cambium and cortex immediately adjacent to the exposed region. This drying out may extend as much as an inch or more under the bark all around the injury, forming a dead region many times as large as the original exposed area. This is well illustrated by the trees shown in Figures 9 and 10. Immediately after tapping in October, 1927, the cuts on



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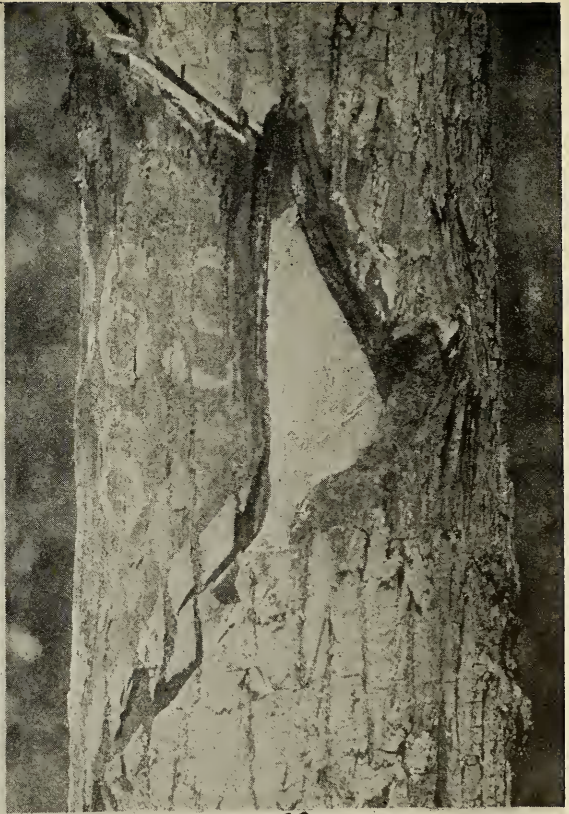

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Injury effects of the native system of tapping.

these trees were painted with white lead to prevent drying out as much as possible. Figure 9 shows the condition in June of the following year. In the lower of the two cuts here shown the outer surrounding bark has been removed, and the area of cambium and xylem exposed at the time of tapping is indicated by the two streaks of white paint. The size of this region as compared with surrounding area is obviously several times smaller. Figure 10 shows a portion of a smaller tree photographed a year after tapping when callus formation had apparently just begun. Removal of the hard outer bark showed a large triangular-shaped dead area of exposed wood. Injury and exposure of the cambium obviously involves not only that portion which is immediately injured at the time of tapping but in addition a considerable surrounding area. As a consequence, callus formation must begin a considerable distance back from the border of the original cut underneath the bark, as is shown in Figure 10. If, on the other hand, the chiclero moderates the depth of tapping, and the cambium is not exposed to drying, callus formation begins very shortly in the incisions.

Another destructive result of the machete-spiral method of tapping is that on the side of the tree where the oblique rows of cuts intersect, a panel or zone is formed which is traversed by a zigzag line or channel of cut bark (Figs. 2 and 3). Each oblique row makes an acute angle where it intersects the one below and above, and as a result this panel includes a large number of acute angles. If the cuts are deep and injure and expose the cambium, and if subsequent drying out at the angles is severe, the bark of the entire zone may sometimes slough off, leaving bare an irregular panel running the entire length of the bole, as is shown in Figure 11. Such exposed areas require many years for healing, and in the meantime wood borers and fungi may get in and destroy large regions of xylem and cortex. Figure 12 shows a tree that has been killed by wood borers subsequent to injurious tapping.

The ultimate death or recovery, rate of healing and bark renewal, however, are not dependent entirely on the depth and method of tapping. The age, condition, and reaction of the tree itself play a signficant role. Individual trees which have been carefully tapped may show signs of severe injury and ultimately die, while others which have been bled very severely may readily recover. This is well illustrated in Figures 11 to 13. Although the tree shown in Figure 11

11 12 13

Effects of the native system of tapping on large sapodilla trees.

was severely injured, it is, nevertheless, recovering, as is shown by the well developed callus on both sides of the injured panel. The tree shown in Figure 12 was killed by the combined effects of tapping and wood borers. Figure 13 illustrates a magnificent specimen which has been tapped twice and shows no signs of permanent injury. Shortly after this photograph was taken it was tapped a third time and gave a large quantity of latex. In individual cases it is thus difficult to predict the ultimate effect of tapping and the reaction of the tree to injury.

There is little doubt, however, that the native machete-spiral system of tapping is ruthless compared to the method employed on *Hevea braziliensis* and is gradually killing a large number of trees. This, together with the large amount of gum annually extracted and exported from the chicle areas, and the apparent slow growth of *Achras zapota,* is gradually exhausting the forests of "wild" virgin sapodilla trees. Areas in which supply of chicle seemed almost inexhaustible a quarter of a century ago are thus becoming depleted. On the other hand, there are many contractors who maintain that the present demand and consumption is compensated by the rate of growth and healing of *Achras zapota* and that a sufficient number of young trees come into profitable yield each year to offset to some degree the long interval of time required for a tapped tree to heal. The chief basis for their argument is that certain old chicle concessions or areas have been yielding approximately the same amount of gum for almost twenty-five years and that chicle exports have been increasing steadily. To anyone familier with the conditions in such areas and who has had intimate contact with the chicleros, it is obvious that the task of maintaining the annual demand is becoming more difficult each year. Chicleros must accordingly tap smaller and younger trees each year to meet the demand, and it is not uncommon to find trees as small as eleven inches in circumferences which have been completely tapped. To the writer, who has spent several years of observation and experimentation in tropical America, it is obvious that the demand in normal times is greater than the annual production of latex by the sapodilla trees in southern Mexico and Central America, and that under present tapping methods and lack of conservation a time will eventually be reached when the supply is exhausted. Before this condition arrives, however, greater utilization of favorable adulterants and chicle substitutes by chewing gum manufacturers may doubtless establish an equilibrium between supply and demand of raw chicle and thus indefinitely postpone the time of exhaustion.

Although it has been apparent for a number of years that the present system is gradually depleting the chicle forests, no determined effort has yet been made towards conservation, and it is only within recent years that serious attention has been directed to chicle production on a plantation basis. Since the tropical forests of southern Mexico and Central America contained at first seemingly inexhaustible quantities of chicle that could be extracted at comparatively small expense, this attitude was to be expected, and it was quite natural that no extensive effort was made to cultivate *Achras zapota*. Sporadic small-scale attempts at cultivation have been reported (Anonymous, 1923) from Mexico and the Far East, but until two decades ago no significant efforts were made to cultivate the sapodilla tree. The present status of the sapodilla tree as to methods of tapping, identification and selection of the best-yielding varieties, plantation culture, etc., remind one very much of *Hevea braziliensis* in the early years of the rubber industry. Years of rubber gathering in the wild were necessary before the importance of plantation production was realized, and then followed a long period of experimentation with methods of tapping, propagation, and cultivation, with the result that the present highly specialized methods of rubber culture finally emerged. In relation to plantation production the chicle industry is at present in about the same stage as was the rubber industry at the beginning of the nineteenth century, with the important exception, however, that the sapodilla tree appears much less, if at all, suitable for plantation culture than *Hevea braziliensis*.

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